

Altair



Subject: 9th BIOLOGY

Teacher's notes

Class: Reproduction
and Development

Objectives

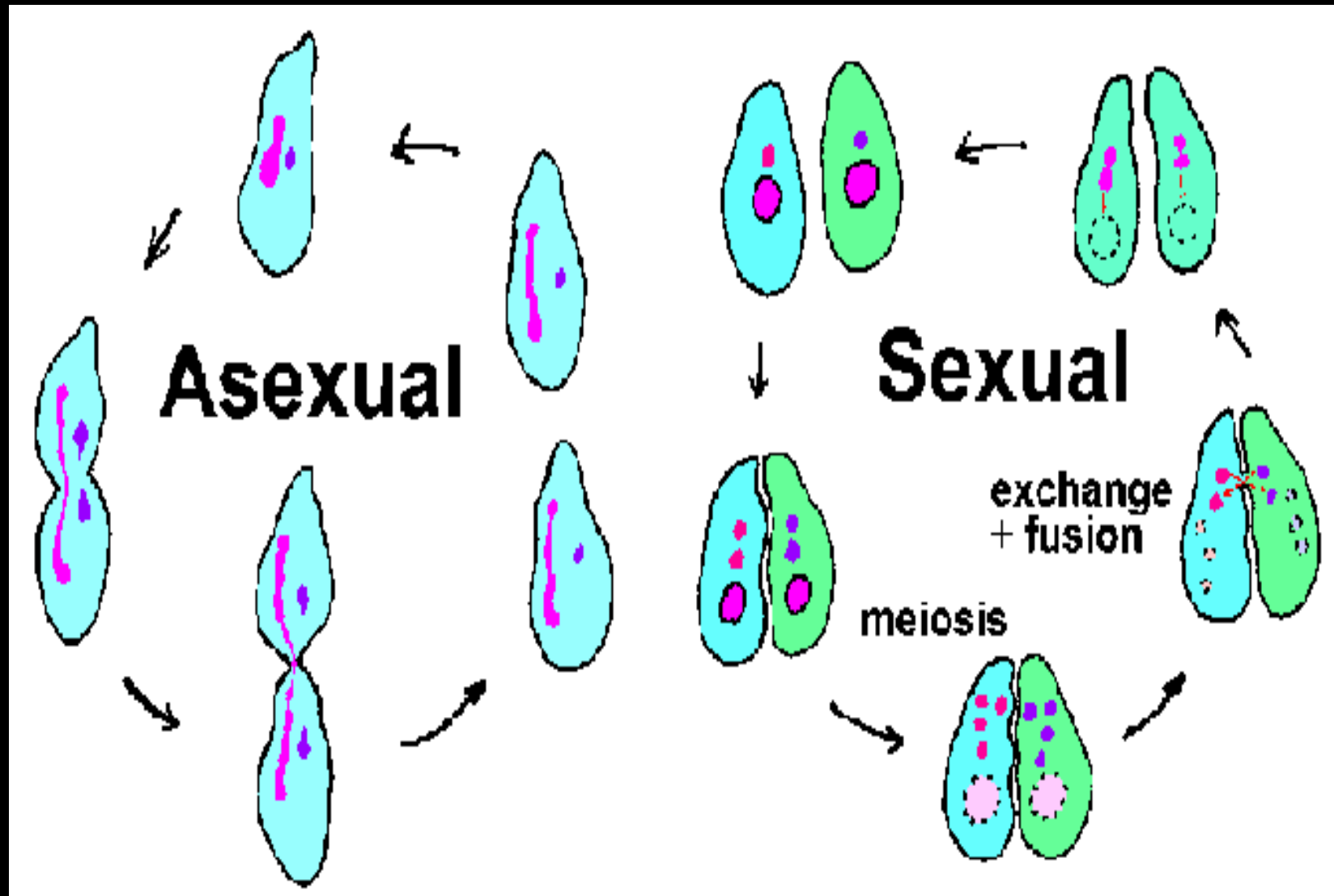
Vocabulary

Link and Learn

Date: August 26th

Prepared by

2011



MALE REPRODUCTIVE SYSTEM



<http://bit.ly/VqqVu>

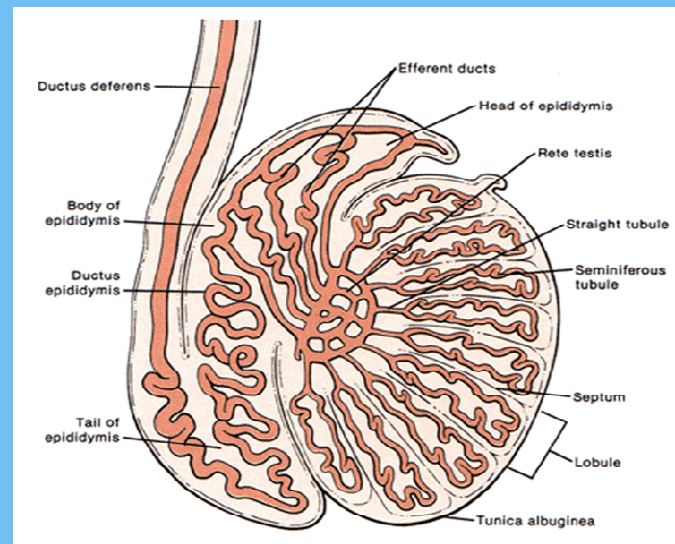


TESTES



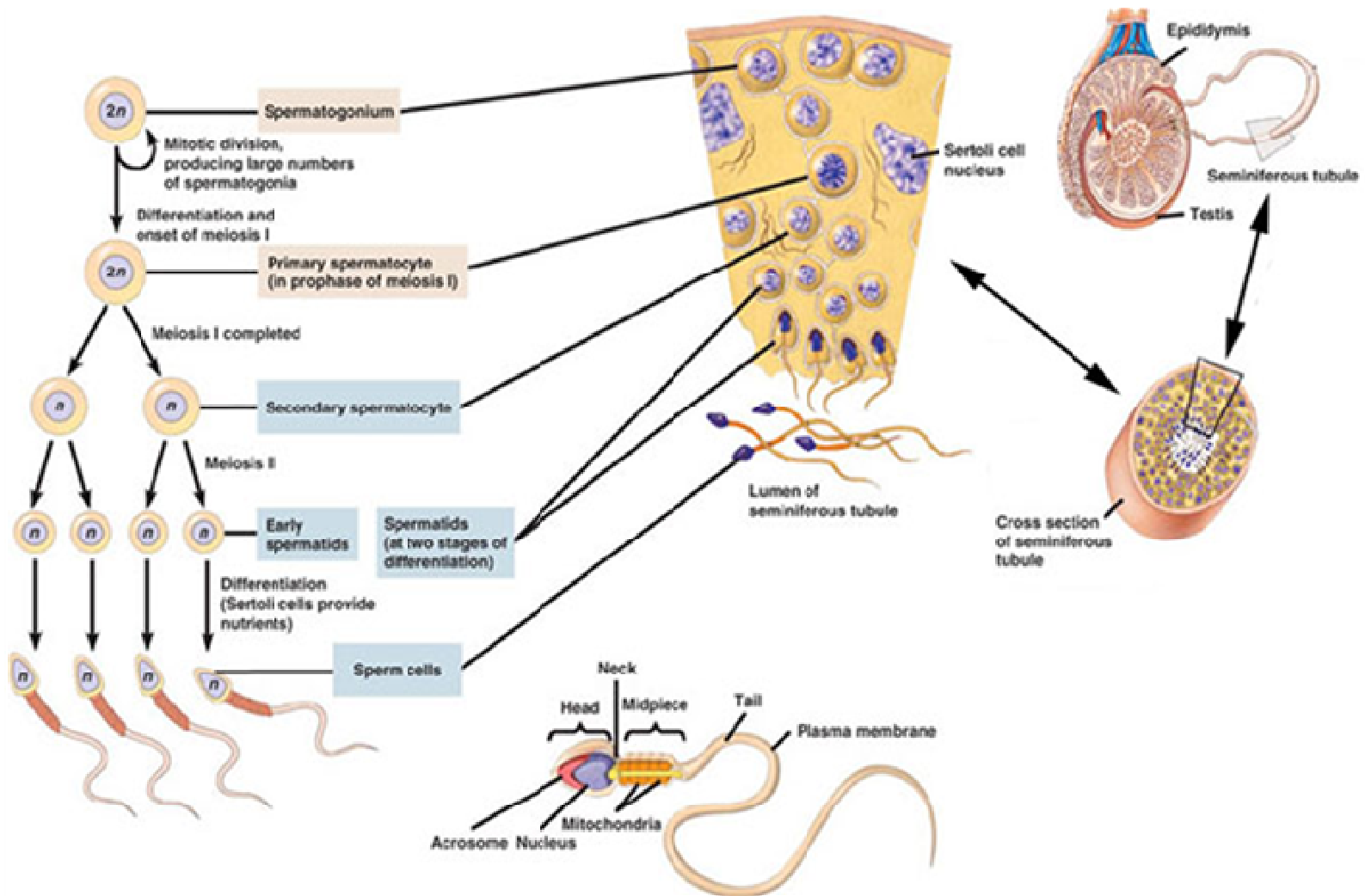
Male

- The roles of a male in sexual reproduction are to produce sperm cells (male gametes) and to deliver the sperm cells to the female reproductive system to fertilize an egg cell.
- The **testes** or testicles, are the sperm-producing organs.
- They are located in the *scrotum*, an external skin sac.
- The testes are initially formed in the abdominal cavity from where they later descend.
- The normal body temperature of 37°C (98°F) is too high for sperm to complete development, in the scrotum the temperature is 3°C lower.



ANIMATION
Male Reproductive System
<http://goo.gl/Oq8Ri>

Spermatogenesis





Spermatogenesis



Male

- A typical Spermatogonium (adult cell) produces several hundred million sperm cells each day in a process that takes around 75 days.
- The sperm cells travel through the *epididymis* where they become mature and capable of moving, and they are stored.
- From the epididymis the sperm moves to the *vas deferens* and to the urethra.

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Spermatogenesis

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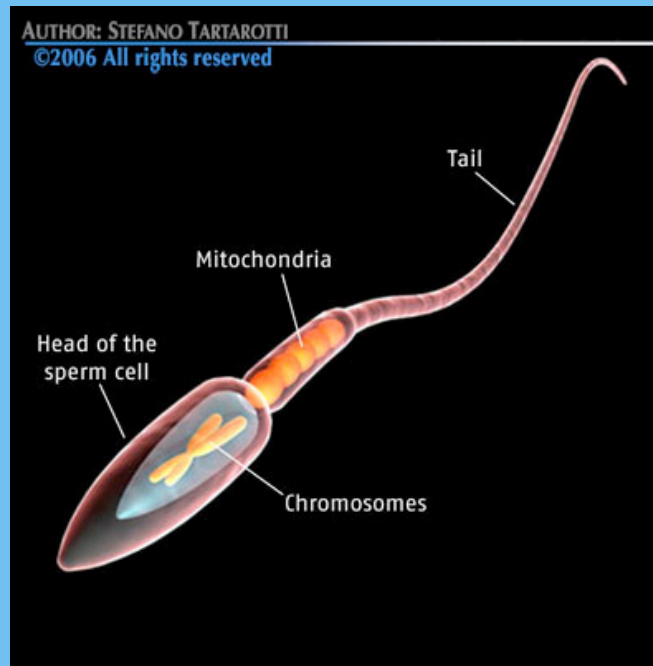


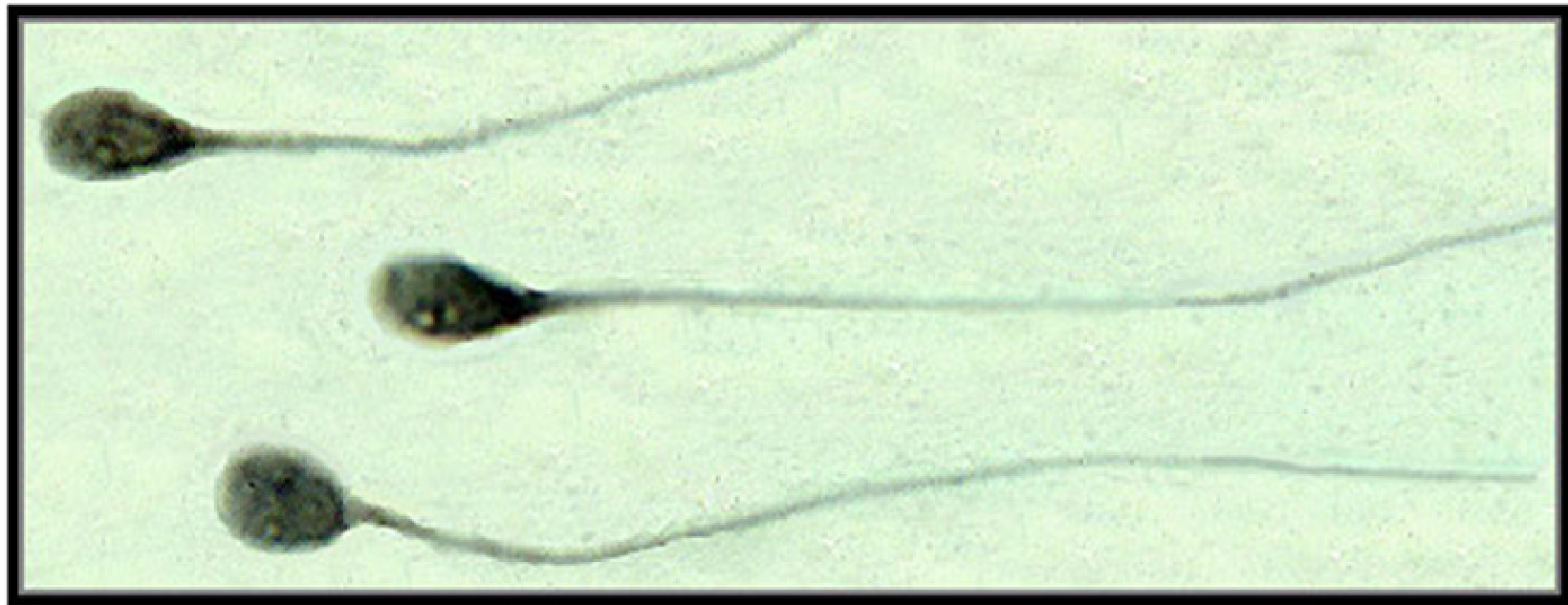
Mature Sperm



Male

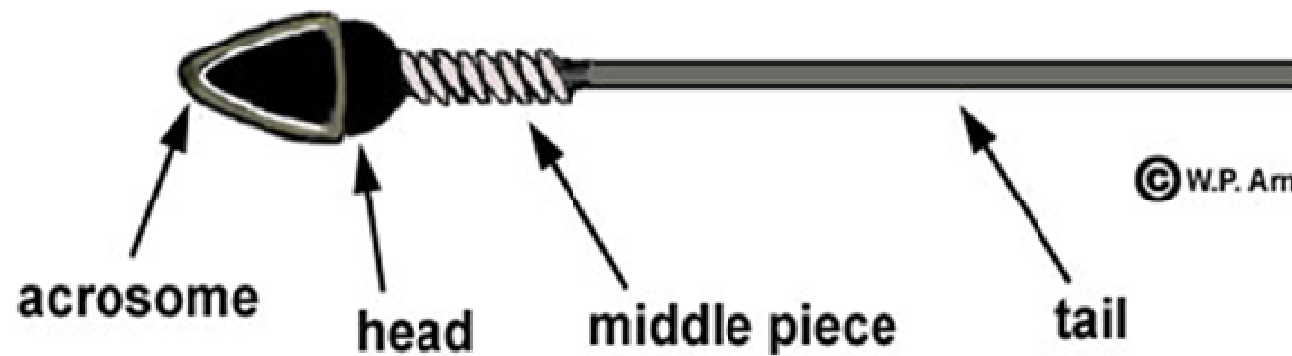
- A mature sperm cell consists of a head with very little cytoplasm, a midpiece, and a long tail.
- Enzymes at the tip of the head, help the sperm penetrate the egg.
- The midpiece contains many mitochondria that supply energy.
- The tail is a flagellum that whips back and forth, helping the sperm to move.



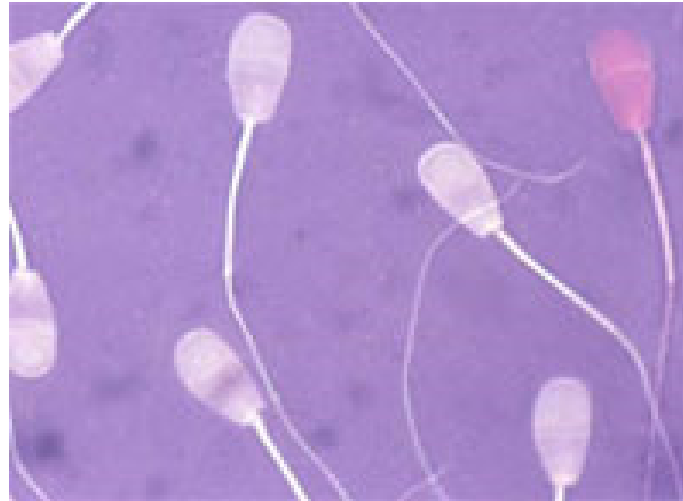


5 μ m

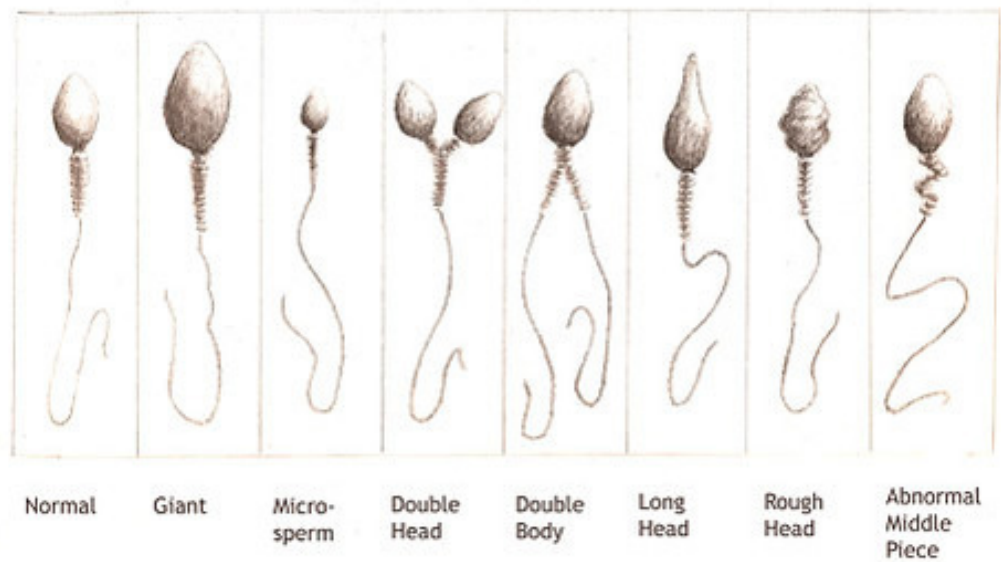
human sperm in semen (1000X)



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Sperm Morphology



<http://bit.ly/1JTPNp>



Delivery of Sperm

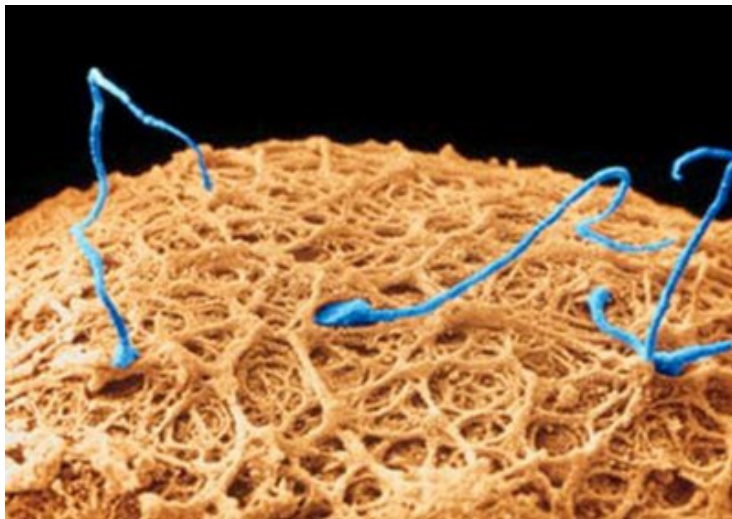


Male

- As sperm cells move into the urethra, they mix with fluids secreted by three exocrine glands: the seminal vesicles (fluid rich in sugar), the prostate glands (alkaline fluids) and the bulbourethral glands (alkaline fluids). This mixture is called semen.
- The urethra passes through the penis, the male organ that deposits sperm in the female reproductive system during sexual intercourse.

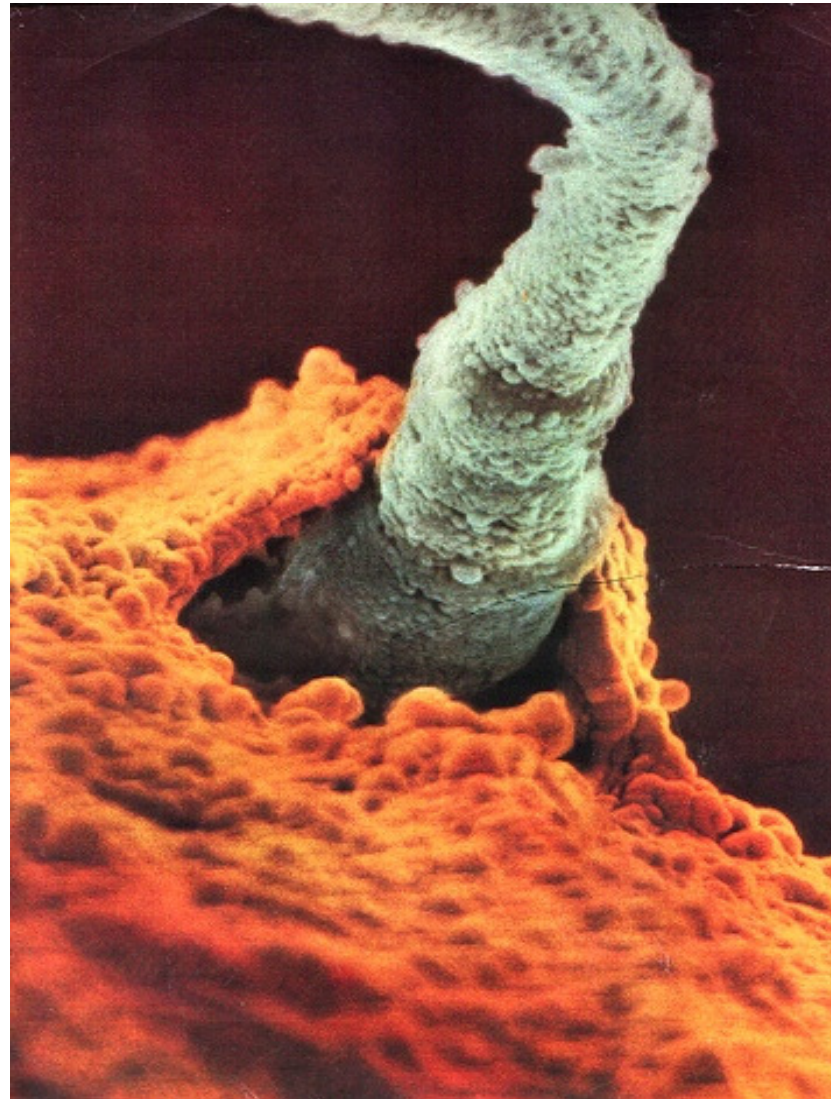
The Journey of Sperm

1. Spermatogenesis in the testis.
2. Maturation in the epididymis.
3. Carried along vas deferens.
4. Fructose for energy and protective mucus picked up at Seminal vesicle.
5. Prostate adds fluids to neutralize acid in the vagina.
6. Ejaculation through the penis, via the urethra.



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<http://bit.ly/4osEh2>



FEMALE REPRODUCTIVE SYSTEM

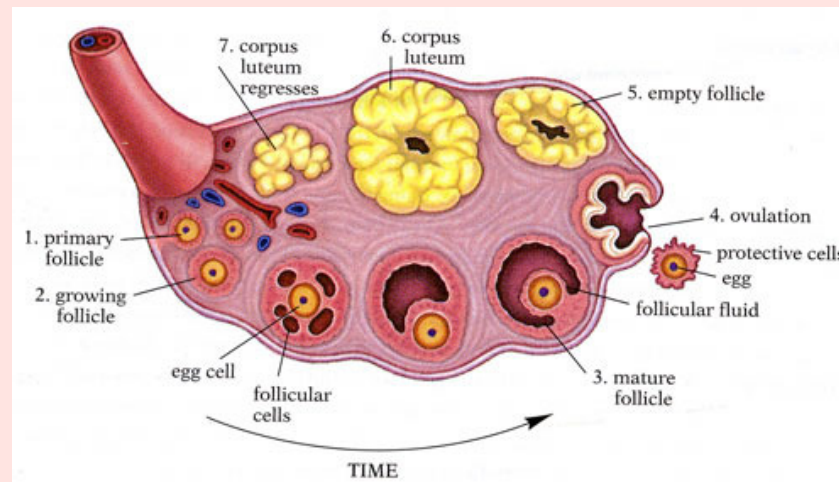


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Female

Ovaries

- Each month, the female reproductive system prepares for a possible pregnancy by producing a mature egg cell, the female gamete.
- The ovaries are the gamete-producing organs of the female reproductive system, located in the abdominal cavity.
- Females are born with all of the egg cells they will ever produce. At birth, the ovaries contain about 2 million immature egg cells.
- Like sperm cells, the eggs are haploid (23 chromosomes) because they're formed through meiosis, in a process called oogenesis.



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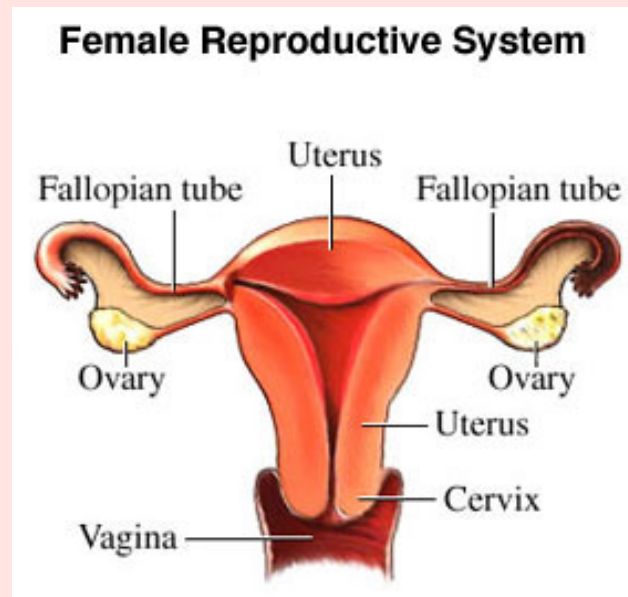


Female Reproductive System



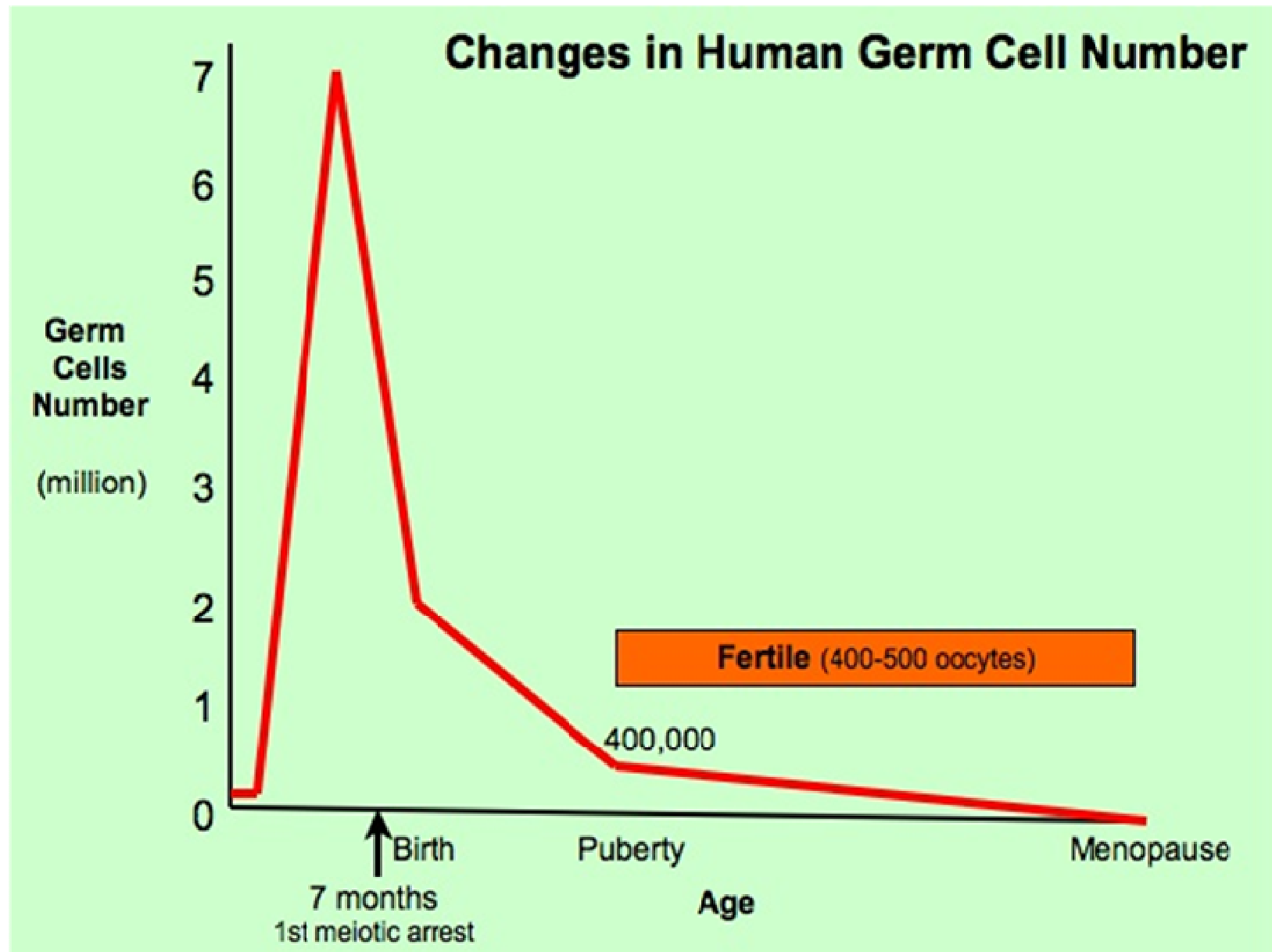
Female

- An egg is released from an ovary about every 28 days to the *fallopian tube*, which is a passage way thorough which an egg moves from an ovary toward the uterus.
- The *uterus* is a hollow, muscular organ.
- When fertilization occurs, development will take place in the uterus.



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ANIMATION
The Female Reproductive System
<http://goo.gl/PjgyX>





Ovarian Cycle

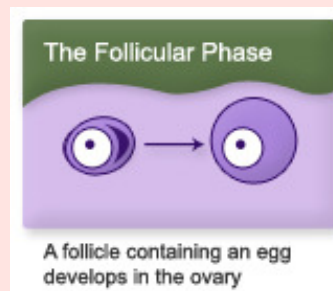


The Ovarian Cycle has two distinct phases: the *Follicular Phase* and the *Luteal Phase*.

Female

FOLLICULAR PHASE: Beginning of the ovarian cycle, whose phases are regulated by hormones from the Hypothalamus (Brain) and the anterior Pituitary.

- In an ovary, egg cells mature within follicles. A *follicle* is a cluster of cells that surrounds an immature egg cell and provides the egg with nutrients, this is done under hormonal control, by FSH and LH.
- FSH causes the egg to develop. The follicle produces estrogen, that aids in the growth of the follicle.



<http://bit.ly/45CIsD>



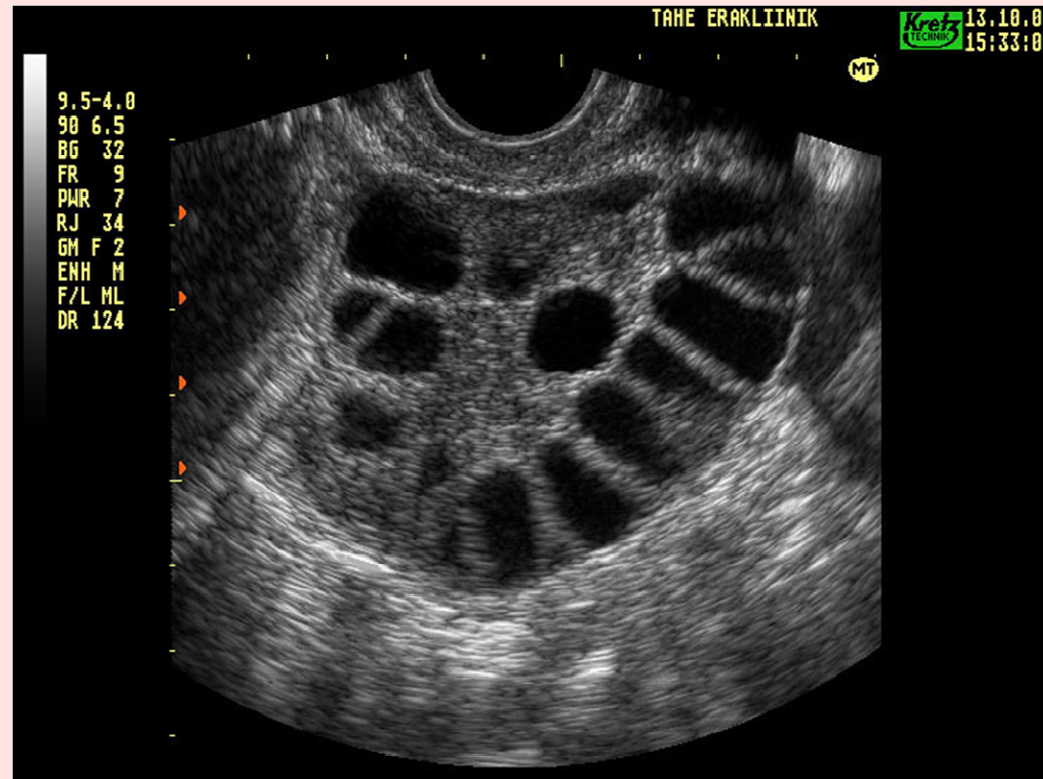
Ovarian Cycle

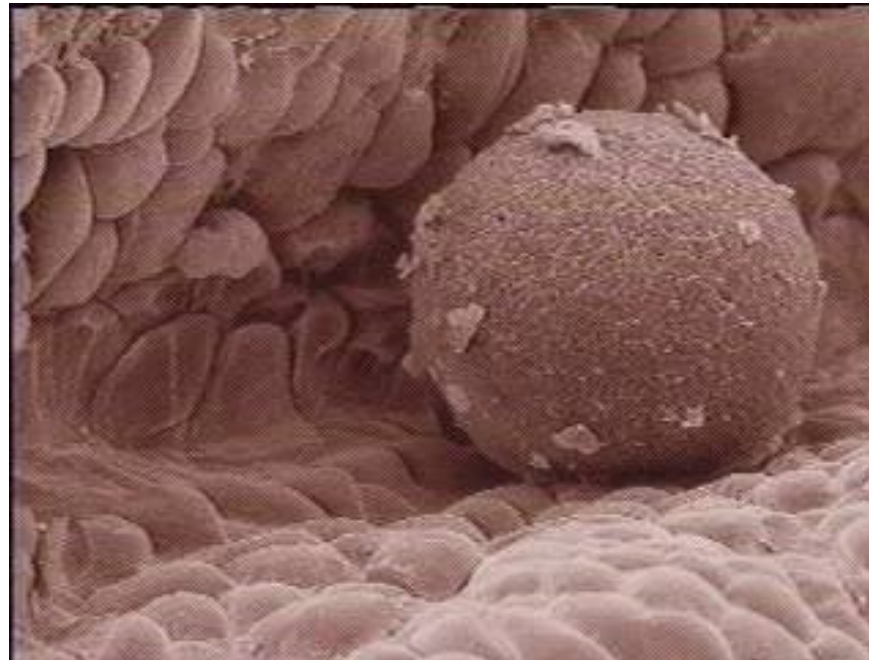


Female

OVULATION

- An intricate control of female hormones is necessary to control the egg development and maturation as well as the rupture of the follicle and ovarian wall and subsequent egg release to the fimbriae.





<http://bit.ly/3ZTmet>

YouTube Video Ovulation

<http://www.youtube.com/watch?v=2-VKgdhfNpY>

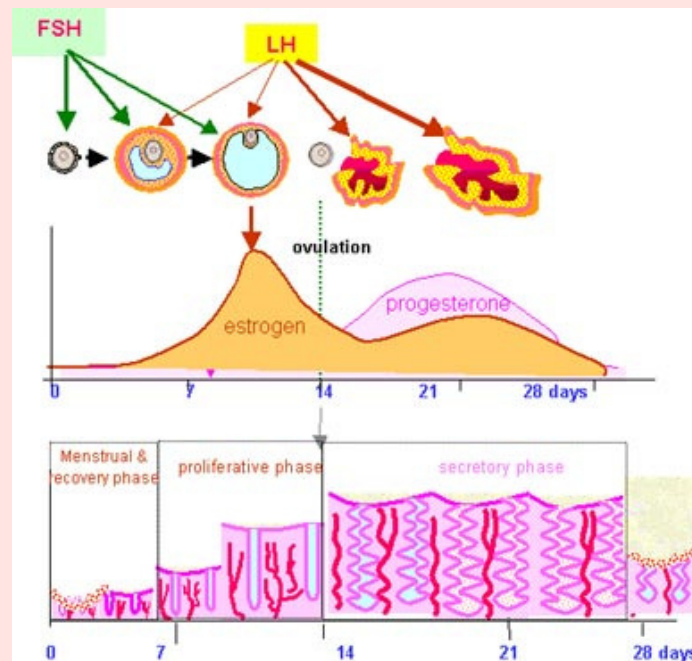
<http://bit.ly/24eT5X>

Female

Ovarian Cycle

LUTEAL PHASE

- After ovulation occurs, LH causes the cells of the ruptured follicle to grow, forming a corpus luteum.
- A *corpus luteum*, is a yellow mass of follicular cells that functions like an endocrine gland, secreting estrogen and progesterone preventing the development of new follicles during the luteal phase and preparing the rest of the body for a potential pregnancy.



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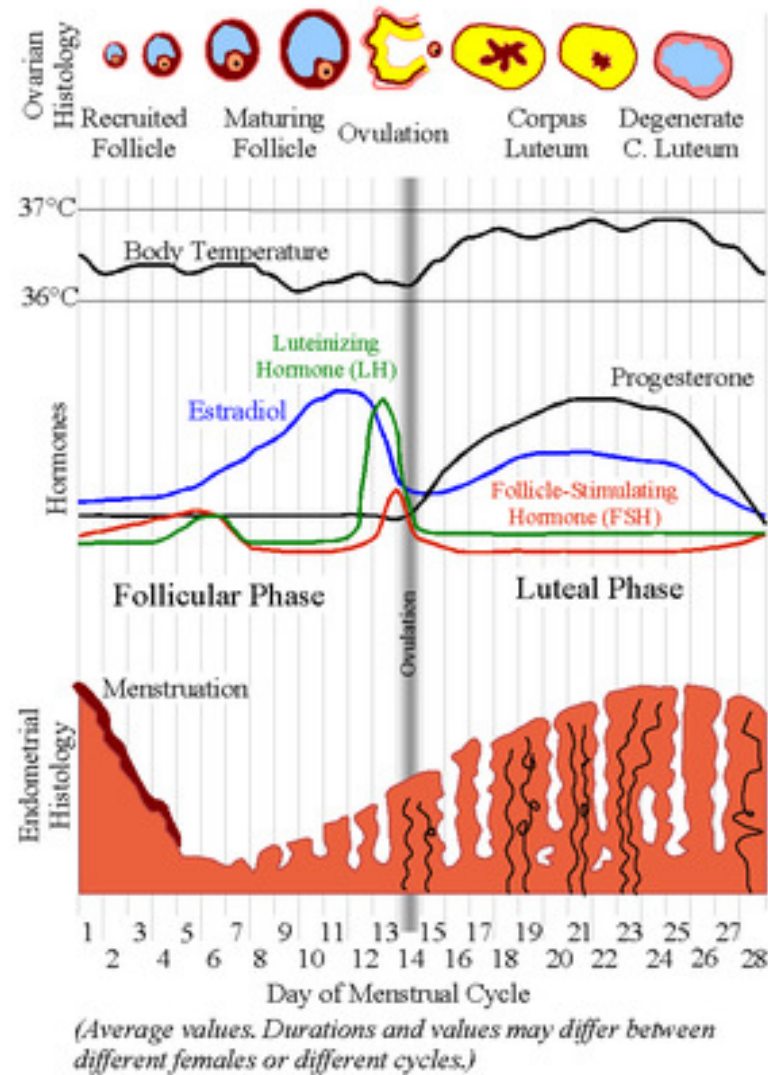


Menstrual Cycle

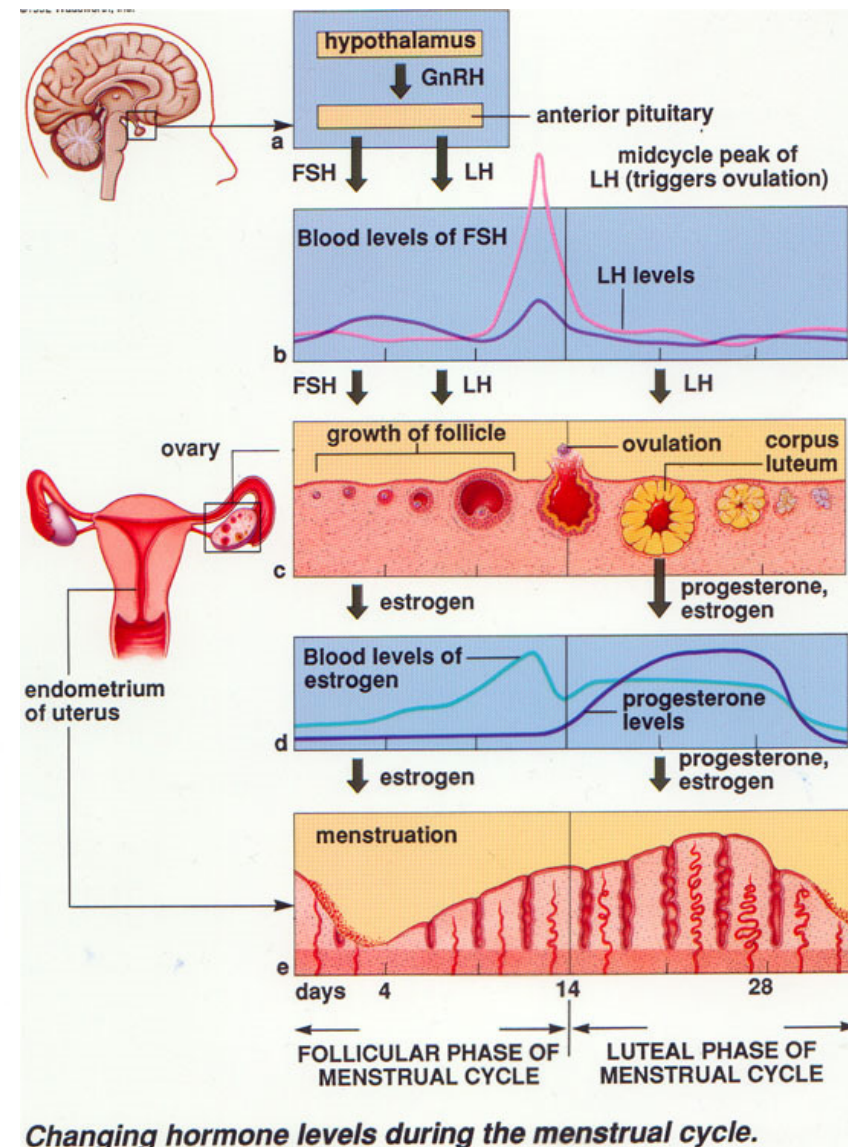


Female

- While changes occur in the ovaries during the ovarian cycle, changes also occur in the uterus to prepare it for a possible pregnancy each month, this is called the *menstrual cycle*, which lasts about 28 days.
- The menstrual cycle is also influenced by hormones.
- The end of the menstrual cycle coincides with the end of the luteal phase of the ovarian cycle.



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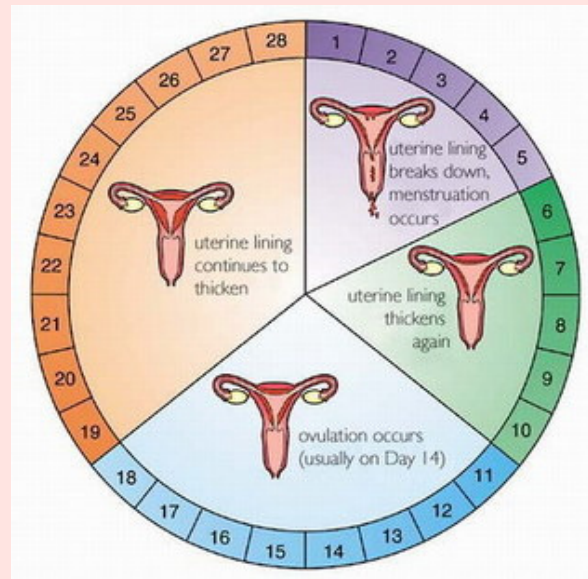


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Female

Menstruation

- When the lining of the uterus is shed, blood vessels break and bleeding results, a mixture of blood and tissue then leaves the body, this process is called *menstruation*.
- It usually occurs 14 days after ovulation.
- Women eventually stop menstruation, usually between the ages of 45 and 55, this event is called *menopause*.
- After that event, women no longer ovulate ending her reproductive cycle.



<http://bit.ly/3kXsfF>



Preparation for Pregnancy



Female

- Progesterone signals the body to prepare for fertilization.
- If fertilization occurs, the corpus luteum continues to produce progesterone for several weeks.
- If fertilization does not occur, production of progesterone slows and eventually stops, marking the end of the ovarian cycle.

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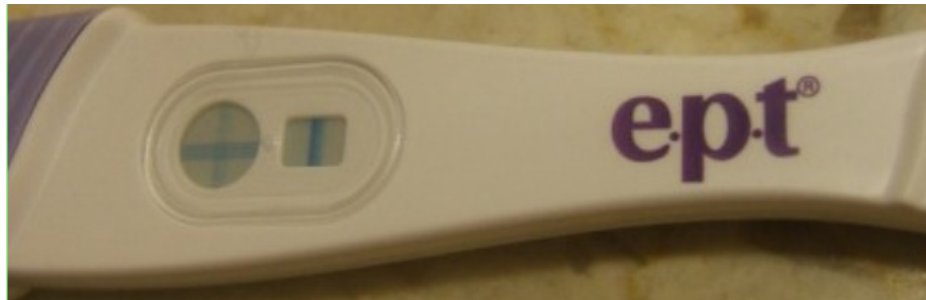
YouTube Video

Ovulation 2

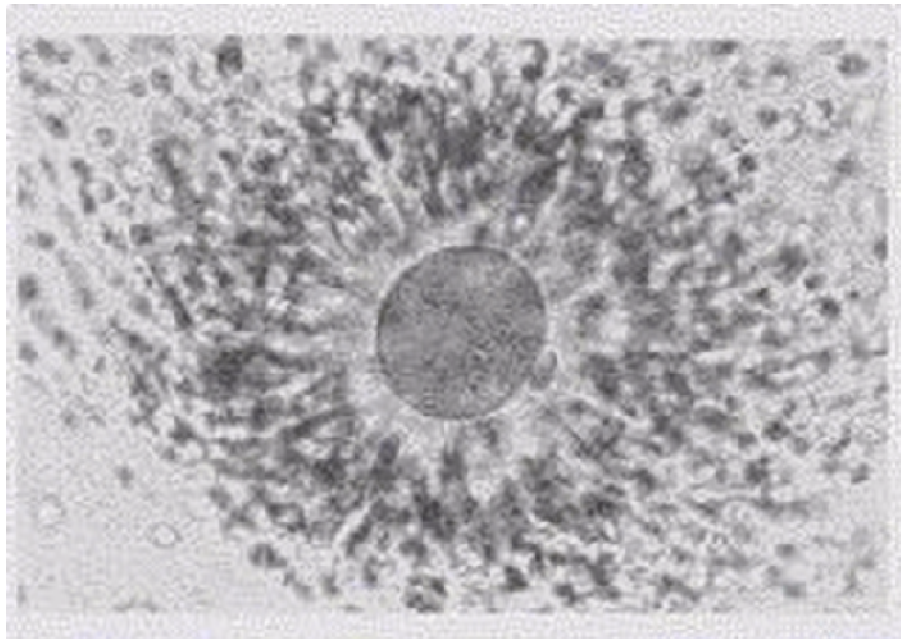
<http://www.youtube.com/watch?v=hAgOk3-loUY>

<http://bit.ly/3B0AGT>

PREGNANCY



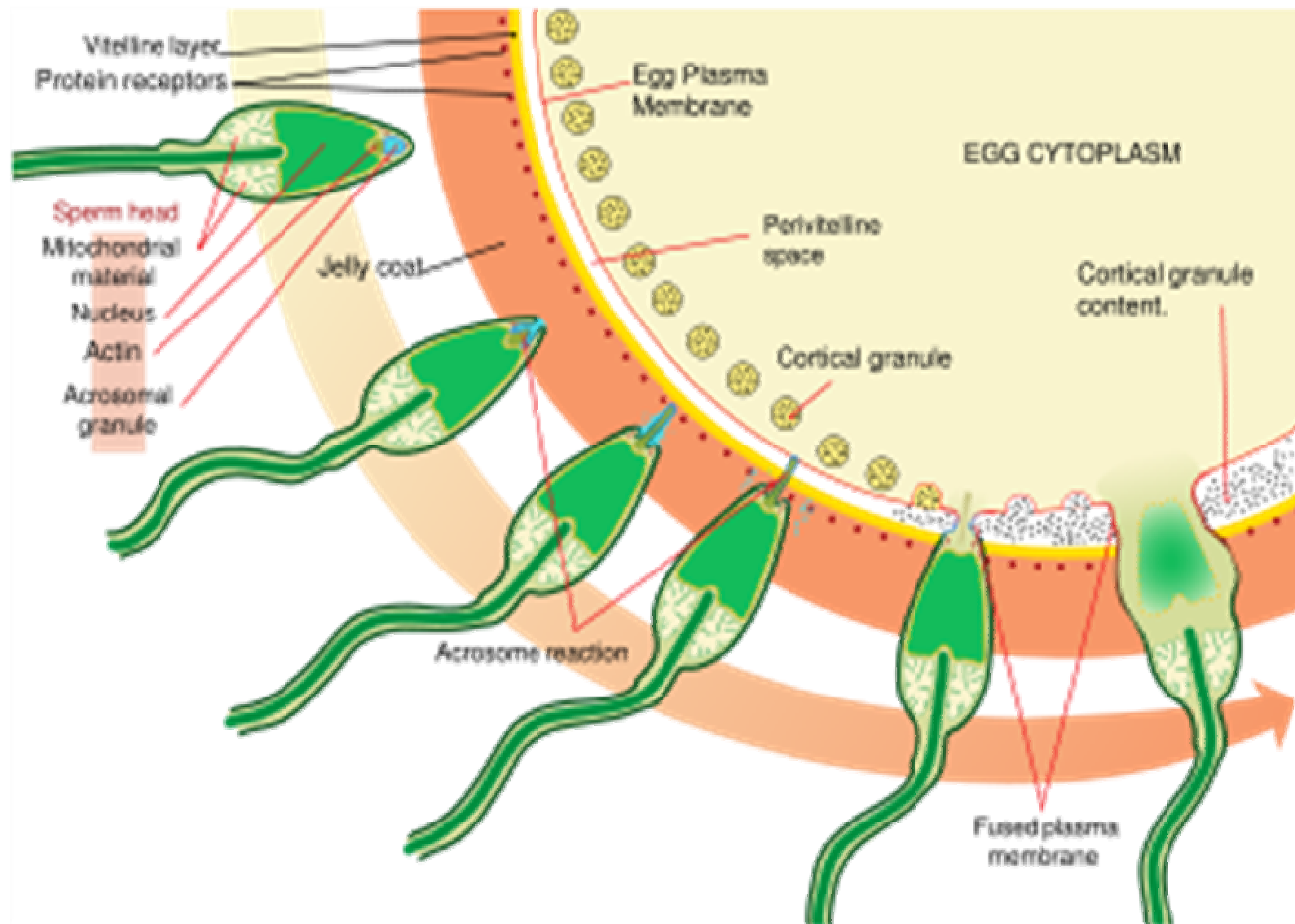
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<http://bit.ly/4fqIQS>

Fertilization

- To fertilize an ovum, a sperm cell must swim to a fallopian tube, where fertilization usually occurs.
- During fertilization, a sperm cell penetrates an egg by releasing the enzymes at the tip of its head, these enzymes break down the jellylike outer layer of the egg.
- The head of the sperm enters the egg, and the nuclei of the ovum and sperm fuse together, producing a diploid cell called a *zygote*.



ANIMATION

Human Fertilization

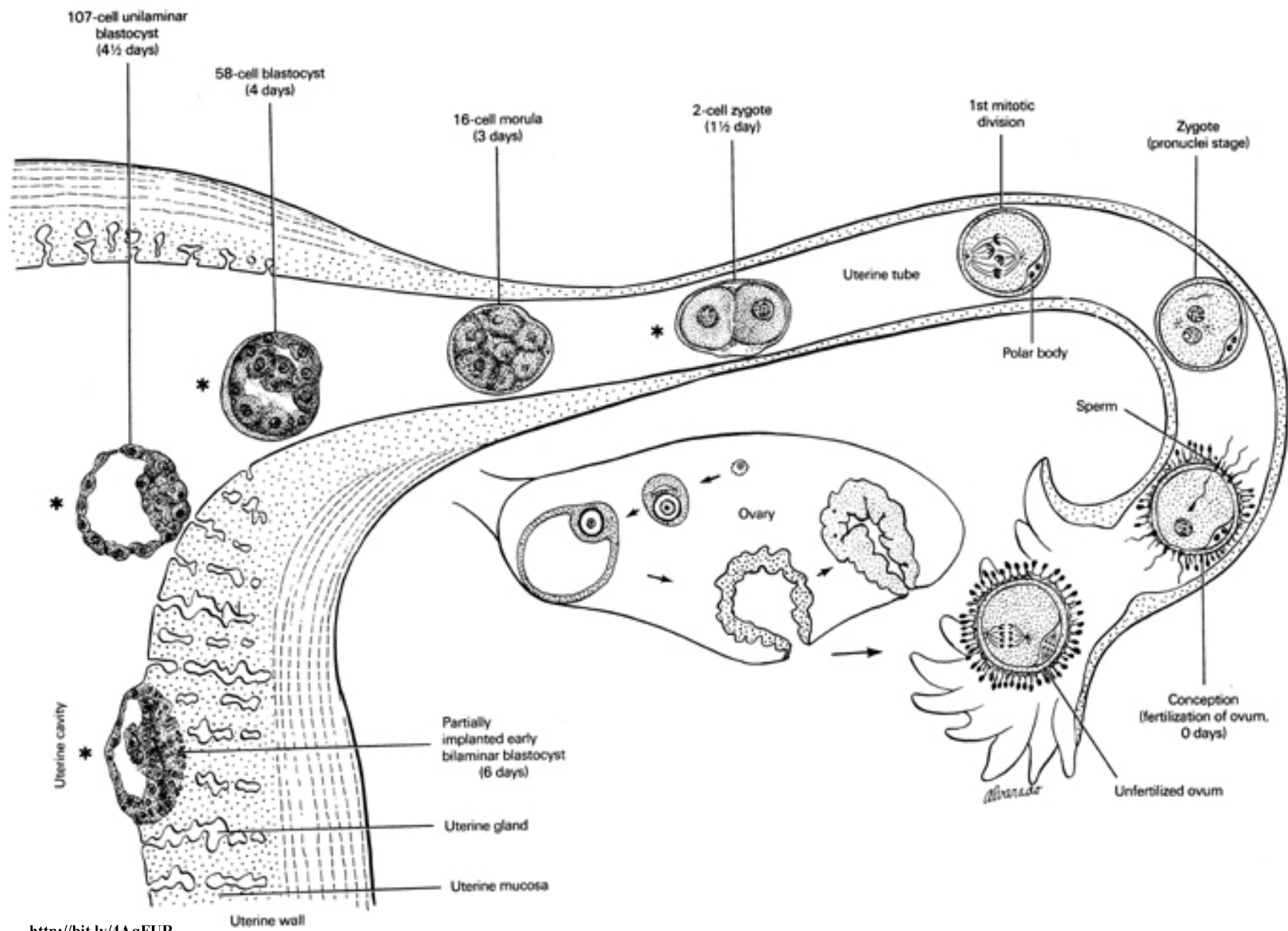
<http://goo.gl/EZthC>

HUMAN FERTILIZATION

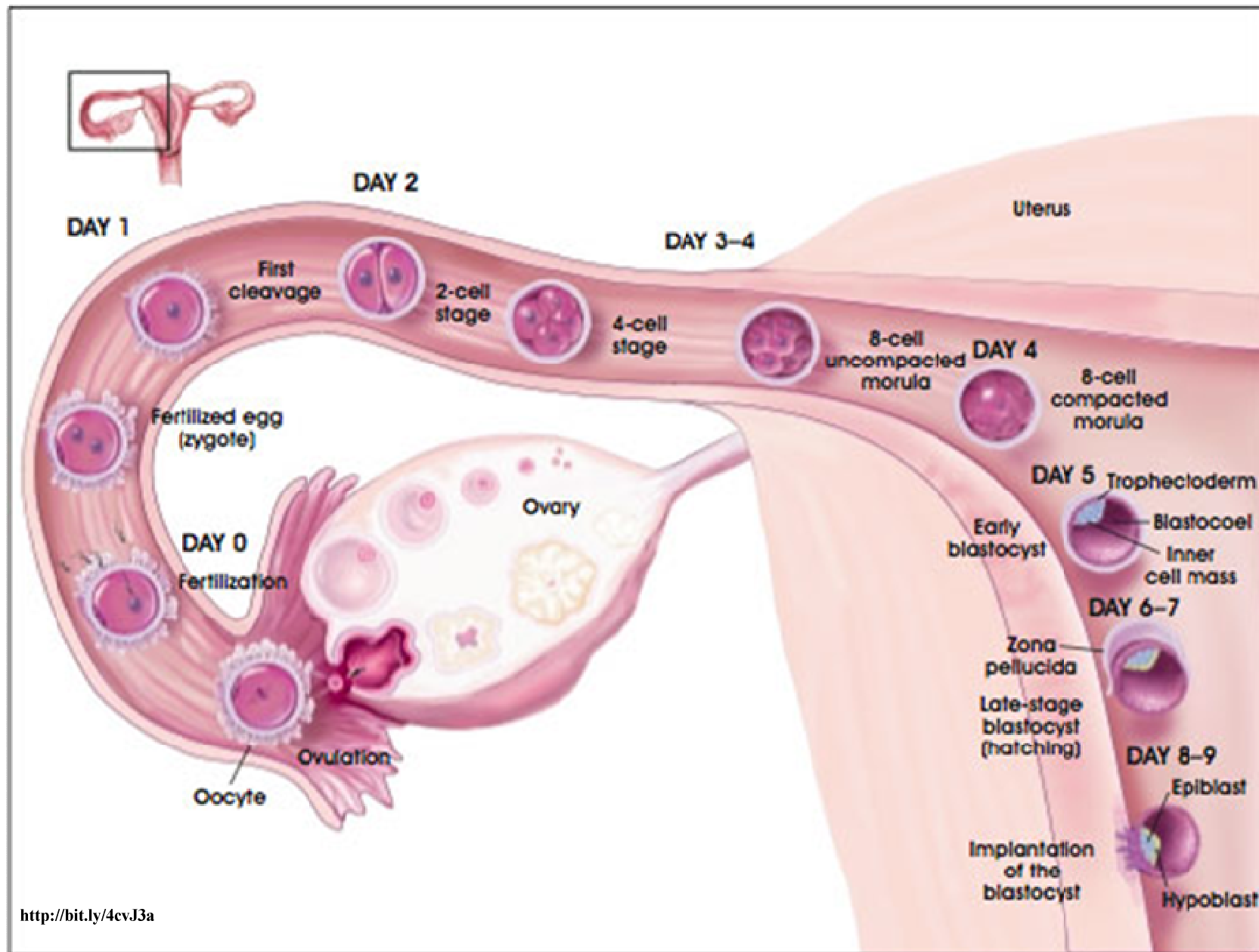
YouTube Video
Human Fertilization
<http://bit.ly/EXsCl>

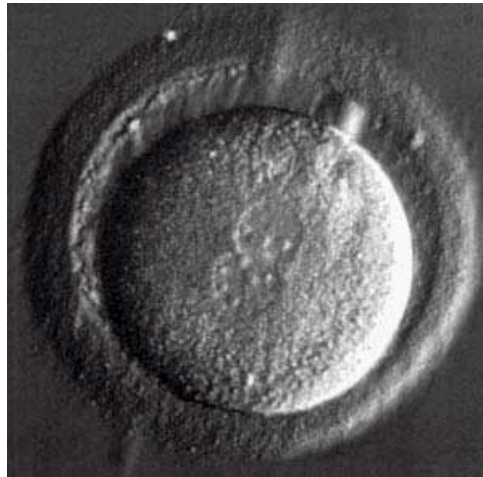
Cleavage and Implantation

- In the first week after fertilization, the zygote undergoes a series of internal divisions known as *cleavage* (2, 4, 8, 16 cells, etc.) within the zygote.
- Cleavage continues as the zygote moves through the fallopian tube toward the uterus.
- When it reaches the uterus, the zygote is a hollow ball of cells called a *blastocyst*.
- About 7 days after fertilization, the blastocyst penetrates the lining of the uterus in an event called *implantation*, which is followed by subsequent development of body structures into a new living human.



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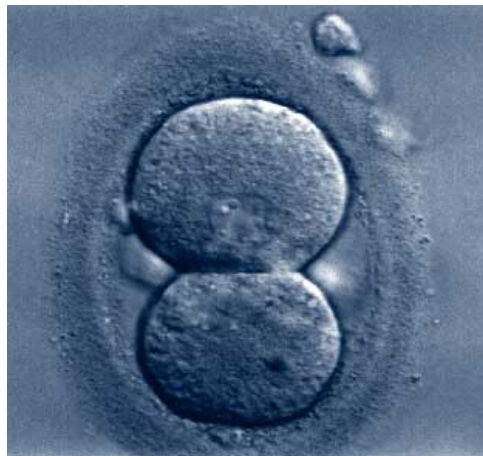




Normal Pronuclei - 2 PN
First Sign of Fertilization
18 hrs post-insemination



Abnormal Pronuclei - 3 PN
Sign of Abnormal Fertilization

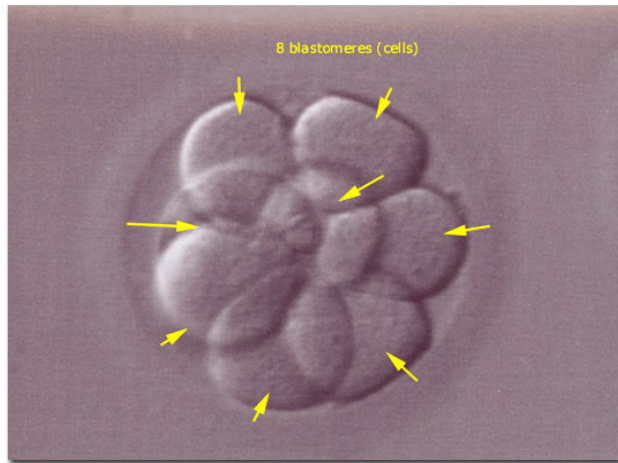


Normal 2-Cell Embryo
Day 1

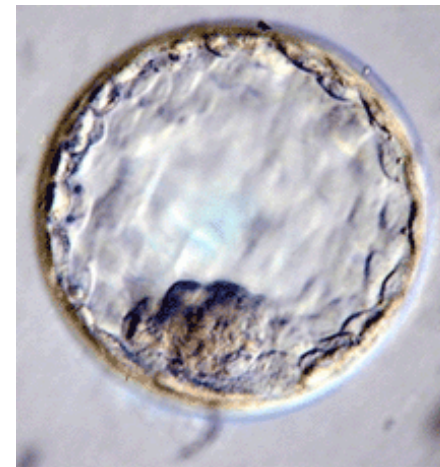


Normal 4-Cell Embryo
Day 2

<http://bit.ly/W53KJ>
<http://bit.ly/gKJdi>
<http://bit.ly/37Yr18>
<http://bit.ly/401ZXo>



**Normal 8-Cell Embryo
Day 3**

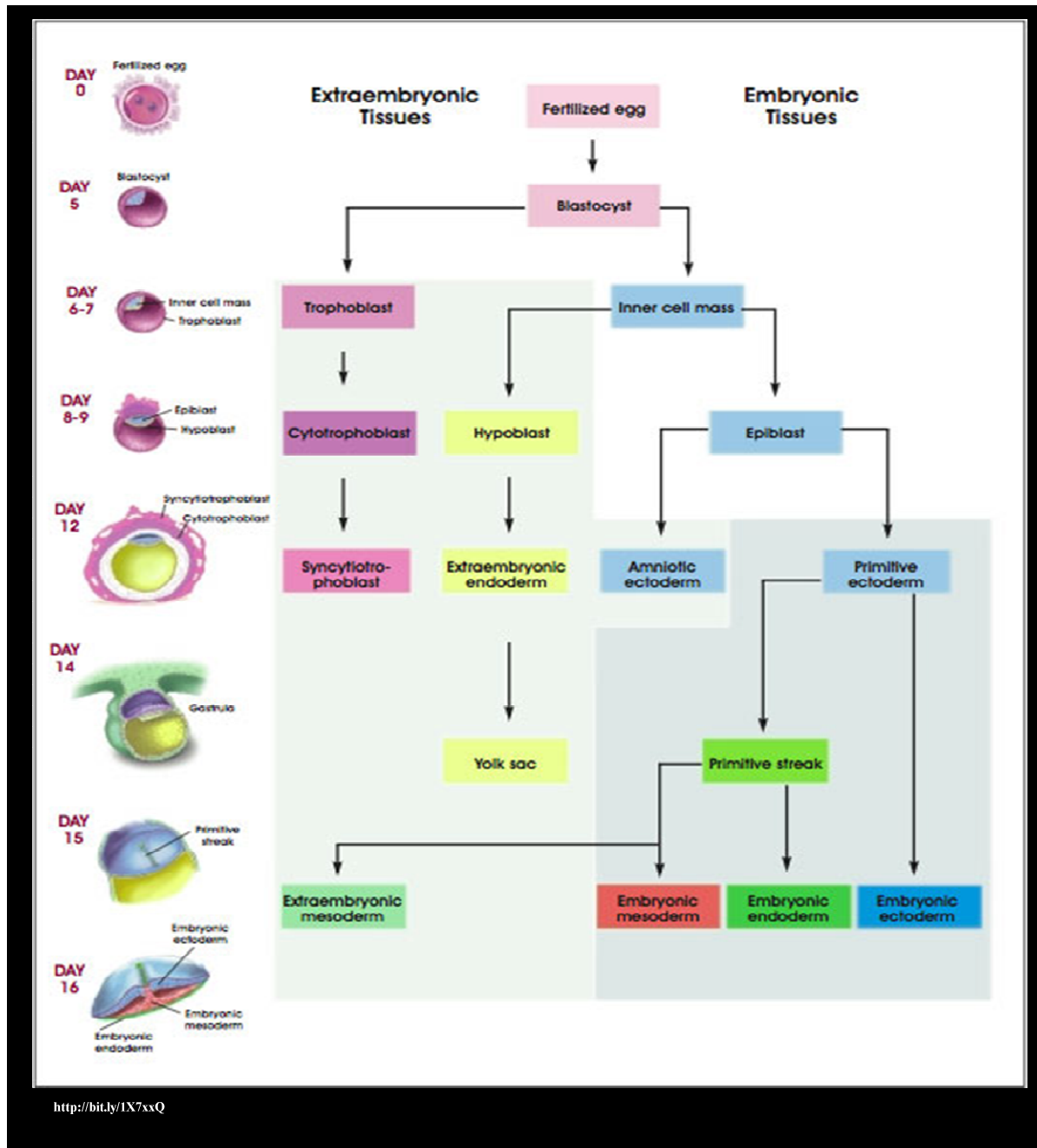


**Normal Blastocyst
Day 6-7**



Blastocyst Hatching

<http://bit.ly/2Tv4ts>
<http://bit.ly/22Lijl>
<http://bit.ly/3M6gY8>



Carnegie Stages of Human Development

Dr Mark Hill, Cell Biology Lab, School of Medical Sciences (Anatomy), UNSW



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YouTube Video
Birth Animation
<http://bit.ly/QLXdu>